

A new method in quantity and 3D network determination of minerals in petrological studies with micromodeling; a case study from garnet at the first skarn zone of Hassan-Abaad, Yazd

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Abstract: The determination of mineral quantities is one of the primary purposes of petrology and economic geology studies. When producing skarn zonation, it is necessary for the quantities of minerals in each zone to be known. Currently, various methods of determination for mineral quantities in rock bodies have been developed, but a rapid, accurate and economic method for distinguishing 3D mineral distribution has not yet been understood. This study introduces such a method for distinguishing 3D mineral distribution based on image sequence modelling of rocks. In the studied area, -Hassan-Abaad of Taft, central Iran- garnet is one of the most important and most frequent minerals found in skarns and is present in a variety of types and places. For our study, we sampled a very thin layer of rock (300 microns) and prepared a digital photo at every stage of our analysis. Prepared images were analyzed using MATLAB software. Each value of the image with its x, y and z coordinates was stored in a new matrix. Matrices were modelled in RockWorks and filtered based on the mean standard deviation of the modelled data, producing garnet networks. The studied zone had 31.4% garnet, allowing to be considered a garnet- wollastonite zone. This method is also useful for different calculations, such as: determining rock type, field zonation, calculation of the amount of mine and waste material, fluid inclusion studies and distinguishing type and volume of rock porosity.

Keywords: *micromodeling, 3D network, garnet, mineral volume quantity, Hassan-Abaad, Yazd.*